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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
RIVERA, JOSHEL	
ART UNIT	**PAPER NUMBER**
1791	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/536,696	GRISARD ET AL.	
	Examiner	Art Unit	
	JOSHEL RIVERA	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 February 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☒ Claim(s) *2* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 May 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/27/2005,11/8/2005,2/23/2006,6/12/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed February 23, 2006 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because it is a duplicate of the IDS filed on November 8, 2005. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

Claim Objections

2. Claim 2 is objected to because of the following informalities: the claim reads "...the means of determining the thickness having imperfections..." where it should read "...the means of determining the thickness *of the upper part of the initial grating* having imperfections...". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1 – 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 1 recites "…layers having at least two nonlinear coefficients having algebraically different values…" It is not clear what the applicant means by stating that the layers have "nonlinear coefficients with algebraically different values". Claims 2 – 12 depend on claim 1, therefore they are also rejected under the same basis.

5. Additionally claim 2 recites the limitation "the means of determining the thickness having imperfections" in the second and third line of the claim. There is insufficient antecedent basis for this limitation in the claim. Claim 1 recites a step of determining a thickness but there is no mention that this step is done using any means.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1, 2, 4, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhat et al (US Patent 5,796,902).

8. With regards to claim 1, Bhat teaches a method of producing a non linear optical waveguide where the surface of the template is polished removing excess material and leaving a planarized surface (column 7 lines 18 – 27) then a waveguide structure is epitaxially grown over the template surface (column 7 lines 55 – 56). Bhat fails to explicitly disclose determining the thickness of the upper part of the initial grating that has the structural imperfections and cleaning and checking the polished surface.

9. It would have been obvious to one of ordinary skills in the art at the time of the invention to first determine the thickness of the part where the structural imperfections are located before polishing the surface and checking and cleaning the polished surface

before epitaxially growing a waveguide structure on the polished surface in Bhat's producing method. The rationale being that Bhat states that the polishing step is done to remove enough material to expose the pads and the plugs remaining in the apertures (column 7 lines 23 – 26). One of ordinary skills would first determine the amount of excess material in order to avoid damaging the template structure during the polishing step. Additionally, since Bhat states that one would remove enough material to expose the pads and plugs, it would indicate that checking the polished surface is intrinsic in order to determine if the pads are exposed or not. Finally cleaning the surface after polishing would be intrinsic in order to remove contaminants or residue from the polishing process.

10. With regards to claim 2, the teachings of Bhat are presented above. Bhat fails to explicitly disclose the use of optical display devices in order to determine the thickness of the surface having the imperfections.

11. It would have been obvious to one of ordinary skills in the art at the time of the invention to use optical display devices in order to determine the thickness of the part that has imperfections in Bhat's manufacturing process. The rationale being that, since Bhat states that the polishing step is done to remove enough material to expose the pads and the plugs remaining in the apertures (column 7 lines 23 – 26), in order to view the surface and to view the excess material at a nano or micro scale as this process is being performed one would intrinsically need an optical display device since the human eye is not capable of seeing at this scale.

12. With regards to claim 4, the teachings of Bhat are presented above. Additionally Bhat illustrates in Figure 7 that the initial nonlinear grating (items 62 and 63) is supported by a substrate (item 42) of Gallium Arsenide with a lower surface (a solid line at the bottom of the figure) and a plane upper face coinciding with the first face of the of the initial nonlinear optical grating (dotted line), which is capable of regrowth due to epitaxial process (column 7 lines 6 – 17), indicating that this substrate is a seed substrate.

13. With regards to claim 11, the teachings of Bhat are presented above. Additionally Bhat explicitly states that the production method is for producing waveguide structures (Abstract, column 7 lines 55 – 67) and teaches embodiments where one layer has a higher refractive index than a lower layer (column 8 lines 21 – 45).

14. With regards to claim 12, the teachings of Bhat are presented above. Bhat explicitly states that the waveguide layers are epitaxially grown by OMCVD (column 7 lines 55 – 56).

15. Claims 3, 8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhat et al (US Patent 5,796,902) as applied to claims 1, 2, 4, 11 and 12 above, and further in view of Becouarn et al ("Second harmonic generation of CO_2 laser using thick quasi-phase-matched GaAs layer grown by hydride vapour phase epitaxy"

Electronics Letters, IEE Stevenage, GB vol. 34, No.25, December 10, 1998 pages 2409-2410).

16. With regards to claims 3 and 13, the teachings of Bhat are presented above. Bhat fails to disclose that the thickness of the initial optical grating is at least 50 microns.

17. Becouarn teaches growing an initial optical grating with a thickness of 100 microns (page 2409 second column first paragraph) used for nonlinear frequency conversion (page 2409 first column first paragraph).

18. It would have been obvious to one of ordinary skills in the art at the time of the invention to have used an initial optical grating with a thickness greater than 50 microns, as suggested by Becouarn, in Bhat's manufacturing method. The rationale being that, as stated by Becouarn, plates with thickness approximately 100 microns can be easily handled without any significant risk of damage (page 2409 first column first paragraph).

19. With regards to claim 8, the teachings of Bhat and Becouarn are presented above. Bhat fails to explicitly disclose that the initial nonlinear optical grating is obtained by HVPE.

20. Becouarn teaches using HVPE as the method to grown nonlinear optical grating (page 2409 Abstract).

21. It would have been obvious to one of ordinary skills in the art at the time of the invention to have used HVPE, as suggested by Becouarn, in order to produce the initial nonlinear optical grating in Bhat's manufacturing method. The rationale being that, as

stated by Becouarn, other types of epitaxial processes, like MOCVD or MBE, have a low deposition rate (page 2409 first column first paragraph).

22. Claims 5, 7, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhat et al (US Patent 5,796,902) as applied to claims 1, 2, 4, 11 and 12 above, and further in view of Lallier et al ("Efficient Second-Harmonic Generation of a CO_2 Laser with a Quasi-Phase-Matched GaAs Crystal", Optics Letters, Vol. 23, No. 19, PP. 1511-1513, 1998).

23. With regards to claim 5, the teachings of Bhat are presented above. Bhat teaches that the seed substrate (Figures 6 and 7 item 42) comprises a crystalline material with a first crystal orientation (Figure 6) and on the upper face of the seed substrate it has a thin structure with a crystalline material having an opposite crystal orientation to the seed substrate (Figure 6). Bhat fails to explicitly disclose that the thin structure was formed from a precursor grating of parallel bands of the same crystalline material.

24. Lallier teaches forming a structure by stacking parallel bands of the same crystalline material, identical to the one used by Bhat, in alternating crystal orientation (page 1511 first column last paragraph, second column first paragraph).

25. It would have been obvious to one of ordinary skills in the art at the time of the invention to have used the same crystalline material but with opposite crystal orientation, as suggested by Lallier, in order to produce a thin substructure for Bhat's manufacturing method. The rationale being that, as stated by Lallier, the material,

Gallium Arsenide, has properties that are favorable with those of usual IR nonlinear materials but is not birefringent which one could take advantage of these properties for quasi-phase-matching techniques (page 1511 first column last paragraph).

26. With regards to claim 7, the teachings of Bhat and Lallier are presented above. Bhat fails to explicitly disclose polishing the lower face of the seed substrate and bonding it to a plane support.

27. Lallier teaches polishing the lower faces of the monolithic structure and bonding the monolithic structure to a graphite support in order to compress the blades (page 1511 second column first and second paragraphs).

28. It would have been obvious to one of ordinary skills in the art at the time of the invention to polish the lower face of the seed substrate and bond it to a support plane, as suggested by Lallier, in Bhat's manufacturing method. The rationale for polishing the surface would have been that, as stated by Lallier, stress and temperature can significantly damage the surface of the crystal that is in contact with the graphite support (page 1511 second column second paragraph). The rationale to use a graphite support would have been, as stated by Lallier, it would facilitate the compression of the crystal blades in order to bond the parallel blades (page 1511 second column first paragraph).

29. With regards to claim 9, the teachings of Bhat and Lallier are presented above. Bhat teaches a first substep of producing a stack of crystalline plates having parallel plane faces and of alternating crystal orientation (Figure 3 it can be seen the plates with the same orientation but on Figure 4 once assemble the final structure the orientations

of the plates alternate between each other) and a second substep of assembling said crystalline plates so as to obtain a single monolithic assembly (Figure 4). Bhat fails to explicitly disclose that the stack of crystalline plates is made of the same material.

30. Lallier teaches forming a structure by stacking parallel bands of the same crystalline material in alternating crystal orientation (page 1511 first column last paragraph, second column first paragraph).

31. It would have been obvious to one of ordinary skills in the art at the time of the invention to have used the same crystalline material but with opposite crystal orientation, as suggested by Lallier, in order to produce a thin substructure for Bhat's manufacturing method. The rationale being that, as stated by Lallier, the material, Gallium Arsenide, has properties that are favorable with those of usual IR nonlinear materials but is not birefringent which one could take advantage of these properties for quasi-phase-matching techniques (page 1511 first column last paragraph).

32. With regards to claim 10, the teachings of Bhat and Lallier are presented above. Bhat fails to explicitly disclose polishing the lower face of the monolithic stack and bonding it to a plane support.

33. Lallier teaches polishing the lower faces of the monolithic structure and bonding the monolithic structure to a graphite support in order to compress the blades (page 1511 second column first and second paragraphs).

34. It would have been obvious to one of ordinary skills in the art at the time of the invention to polish the lower face of the seed substrate and bond it to a support plane,

as suggested by Lallier, in Bhat's manufacturing method. The rationale for polishing the surface would have been that, as stated by Lallier, stress and temperature can significantly damage the surface of the crystal that is in contact with the graphite support (page 1511 second column second paragraph). The rationale to use a graphite support would have been, as stated by Lallier, it would facilitate the compression of the crystal blades in order to bond the parallel blades (page 1511 second column first paragraph).

35. Claim 6 rejected under 35 U.S.C. 103(a) as being unpatentable over Bhat et al (US Patent 5,796,902) and Lallier et al ("Efficient Second-Harmonic Generation of a CO_2 Laser with a Quasi-Phase-Matched GaAs Crystal", Optics Letters, Vol. 23, No. 19, PP. 1511-1513, 1998). as applied to claims 5, 7, 9 and 10 above, and further in view of Becouarn et al ("Second harmonic generation of CO_2 laser using thick quasi-phase-matched GaAs layer grown by hydride vapour phase epitaxy" Electronics Letters, IEE Stevenage, GB vol. 34, No.25, December 10, 1998 pages 2409-2410).

36. With regards to claim 6, the teachings of Bhat and Lallier are presented above. Bhat and Lallier fail to explicitly disclose that the seed substrate has a thickness of at least 300 microns.

37. Becouarn teaches using a seed substrate of a material identical to the one used by Bhat and Lallier with a thickness of 400 microns (page 2409 second column first paragraph). It would have been obvious to one of ordinary skills in the art at the time of the invention to have used a seed substrate with a thickness greater than 300 microns, as suggested by Becouarn, in Lallier and Bhat's manufacturing method. The rationale

being that, as stated by Becouarn, the fundamental wave transmission for nonlinear frequency conversion at the seed substrate is comparable to the average transmission in the grown layer when the displacement is of 400 microns (page 2409 second column second paragraph).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSHEL RIVERA whose telephone number is (571) 270-7655. The examiner can normally be reached on Monday - Thursday 7:30am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Katarzyna Wyrozebski can be reached on (571) 272-1127. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. R./
Examiner, Art Unit 1791

/KAT WYROZEBSKI/
Supervisory Patent Examiner, Art Unit 1791